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Application no/date: 1991-339663[1991/11/28]
Date of request for examination: [1995/ 8/31]
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Registration no/date: 2811246 Translate [1998/ 8/ 7]
Examined publication date (present law): [1998/10/15]
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Applicant: RICOH ELEMEX CORP
Inventor: OBAYASHI MASAKI
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F-Term: 3B202AA03,AA07,AB13,AB15,AB26,BA01,BA02,BB06,BB07,BB10,BC04,BC05,BD04, BD06,BD07,BE10,CA06,CB05,DB01,EF02,EH07,EH08,BA18
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Citation:

[19,1997. 8.26,04 ] (04,JP,Unexamined Utility Model Publication,1988183822)

[19,1997. 8.26,04 ] (04,JP,Unexamined Utility Model Publication,1990107331)
Title of invention: TOOTH BRUSH FOR ELECTRICALLY DRIVEN TOOTH BRUSH SET

Abstract: PURPOSE: To effectively and efficiently brush a necessary brushi ng spot by one tooth brush without selecting electrically driven both brush sets or replacing the tooth brush. CONSTITUTION: A reciprocating member 24 h aving racks 26a-26d and brush gears 27a-27d rotating and reciprocating by en gaging with the racks 26a-26d are provided in the case 21 of a tooth brush 2 0. The first bundle of fur is fitted in the reciprocating member 24 and the second bundle of fur is fitted in the brush gear respectively. The reciproca ting member 24 is driven in the driving part of tooth brush on brushing teet h to reciprocate the first bundle of fur and the brush gears 27a-27d are dri ven through engaging with the racks 26a-26d to rotate and reciprocate the se cond bundle of fur.COPYRIGHT: (C)1993,JPO&Japio

**TRANSLATION FROM JAPANESE**

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(74) Agent: NAKAO Shunsuke, Patent Attorney

(56) Literature Cited: Jikkai 63-18322 (JP, U)

Jikkai 2-107331 (JP, U)

(58) Searched Fields (Int. Cl.[6], DB Title)

A46B 7/06

A46B 13/02

A61C 17/22

(54) [ Title of the Invention ] **Toothbrush [section] for electrically powered toothbrush**

(57) [ Claims ]

[ Claim 1 ] A toothbrush [section] for an electrically powered toothbrush, comprising: a reciprocating member for reciprocating linear motion, [said member] having racks, and carrying first bristle tufts; and brush gears meshing with said racks of said reciprocating member, [said gears] carrying second bristle tufts and undergoing reciprocating rotational motion at predetermined locations.

[ Claim 2 ] The toothbrush [section] for an electrically powered toothbrush apparatus according to claim 1 wherein bristle tufts are arranged in three rows, with said second bristle tufts located in the center and said first bristle tufts located to either side thereof.

[ Claim 3 ] The toothbrush [section] for an electrically powered toothbrush apparatus according to claim 1 wherein said first bristle tufts undergo reciprocating linear motion through reciprocating linear motion of said reciprocating member [driven by] a motor, and said second bristle tufts undergo reciprocating rotational motion through reciprocating rotational motion of said brush gears that mesh with said racks of said reciprocating member.

[ Claim 4 ] The toothbrush [section] for an electrically powered toothbrush apparatus according to claim 1 wherein said second bristle tufts undergo reciprocating rotational motion through reciprocating rotational motion of said brush gears [driven by] a motor, and said first bristle tufts undergo reciprocating linear motion through reciprocating linear motion of said reciprocating member having said racks that mesh with said brush gears.

* NOTICES *



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JP 2911246

CLAIMS

(57) [Claim(s)]
[Claim 1] The gear-tooth brush of the electric toothbrush machine which comes to prepare the brush gear which has a rack, gears with said rack of the reciprocation member which attaches the 1st hair-bundle and carries out a straight-line reciprocating motion, and its reciprocation member, attaches the 2nd hair-bundle, and carries out a rotation reciprocating motion in an orientation.
[Claim 2] The gear-tooth brush of the electric toothbrush machine according to claim 1 which allots a hair-bundle to three trains and comes to equip both sides said 1st hair-bundle with middle as said 2nd hair-bundle.
[Claim 3] The gear-tooth brush of the electric toothbrush machine according to claim 1 which carries out the straight-line reciprocating motion of said reciprocation member by the motor, carries out the straight-line reciprocating motion of said 1st hair-bundle, carries out the rotation reciprocating motion of said brush gear which gears with said rack of the reciprocation member, and comes to carry out the rotation reciprocating motion of said 2nd hair-bundle.
[Claim 4] The gear-tooth brush of the electric toothbrush machine according to claim 1 which carries out the rotation reciprocating motion of said brush gear by the motor, carries out the rotation reciprocating motion of said 2nd hair-bundle, carries out the straight-line reciprocating motion of said reciprocation member which has said rack which gears with the brush gear, and comes to carry out the straight-line reciprocating motion of said 1st hair-bundle.

[Translation done.]

* NOTICES *



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention is attached in the body of a vessel of an electric toothbrush machine, and relates to the gear-tooth brush which brushes teeth by driving electrically by the motor built in that body of a vessel.
[0002]
[Description of the Prior Art] the inside of the former and this kind of gear-tooth brush -- (A) -- there were what brushes teeth by driving that gear-tooth brush itself, and a thing which brushes teeth by driving two or more hair-bundles attached in (B) gear-tooth brush.
[0003] Furthermore, the following gear-tooth brushes were in the gear-tooth brush of (A).
** As shown in drawing 18 , rotation reciprocation of the gear-tooth brush 1 is enabled at the circumference of the die-length direction. And as shown in drawing 17 , the rotation reciprocating motion of the gear-tooth brush 1 was carried out, it brushed teeth by having applied the brush hair 2 between a dental front face or gear teeth, and dirt, such as a dental plaque adhering to about there, was removed. However, with this gear-tooth brush 1, although it was effective in a dental front face or toothbrushing between gear teeth such, it was not effective in toothbrushing of the boundary line of a gear tooth and the gum.
[0004] ** As shown in drawing 16 , straight-line reciprocation of the gear-tooth brush 1 in the die-length direction is enabled. And as the straight-line reciprocating motion of the gear-tooth brush 1 is made to carry out in the direction of the alignment of teeth and it is shown in drawing 15 (a) As it brushes teeth by applying the brush hair 2 to the boundary line of a gear tooth and the gum, and the dirt of the boundary line of the gear tooth and gum is removed or it is shown in (b) It brushed teeth by guessing on the surface of a gear tooth, and the dirt there was removed, and as shown in (c), it brushed teeth by having hit against the dental engagement side, and the dirt there was removed. However, with this gear-tooth brush 1, although it is effective in toothbrushing of the boundary line of a gear tooth and the gum etc., since the brush hair 2 will hurt the gum if the stroke of straight-line reciprocation is large, that stroke is made small. Therefore, when brushing teeth by carrying out straight-line reciprocation of the gear-tooth brush 1 at a small unit (the bus method), effectiveness was bad for removing the dirt of a dental front face, and was not effective in it.
[0005] Next, the following gear-tooth brushes were in the gear-tooth brush of (B).
** As shown in drawing 14 , attach mutually in an opposite direction two hair-bundles 3 which tie up much single hair into a knot to head 1a of the gear-tooth brush 1, and are set to it free [ rotation ]. And as this hair-bundle 3 was rotated, respectively and it was shown in drawing 13 (a) - (b), it brushed teeth by having applied the hair-bundle 3 on the surface of the gear tooth, and the dirt there was removed. However, with this gear-tooth brush 1, although it was effective in toothbrushing of a dental front face such, it was not effective in toothbrushing of the boundary line of a gear tooth and the gum.
[0006] ** As shown in drawing 12 , allot two or more hair-bundles 3 to two trains, and attach each in head 1a of the gear-tooth brush 1 free [ rotation reciprocation ]. And as the rotation reciprocating motion of the hair-bundle 3 was carried out, respectively and it was shown in drawing 11 (a), it brushed teeth by applying a hair-bundle 3 between gear teeth, and the dirt there was removed, or as shown in (b), it brushed teeth by having hit against the dental engagement side, and the dirt there was removed. However, with this gear-tooth brush 1, although it was

effective in toothbrushing between gear teeth etc. such, it was not effective in toothbrushing of the boundary line of a gear tooth and the gum.
[0007]
[Problem(s) to be Solved by the Invention] As mentioned above, the conventional gear-tooth brush has the advantage and a fault, respectively. Therefore, in the former, in order to polish a required toothbrushing part effectively, it is necessary to use properly the electric toothbrush machine furnished with the gear-tooth brush which carries out a suitable motion according to each toothbrushing part one by one. However, now, a troublesome broth and cost also become [ toothbrushing ] high.
[0008] Moreover, there are some conventional electric toothbrush machines considered as the configuration which attaches the gear-tooth brush of its dedication, when enabling for example, straight-line reciprocation and rotation reciprocation of the gear-tooth brush attached in the body of a vessel, carrying out straight-line reciprocation and carrying out rotation reciprocation of the gear-tooth brush of its dedication. And according to the toothbrushing part, the gear-tooth brush was exchanged at the time of toothbrushing. However, now, toothbrushing is troublesome and inefficient.
[0009] Then, the purpose of this invention is to make it possible to polish a required toothbrushing part effectively and efficiently with one gear-tooth brush, without using an electric toothbrush machine properly or exchanging a gear-tooth brush.
[0010]
[Means for Solving the Problem] Therefore, invention according to claim 1 is set to the gear-tooth brush 20-40 of an electric toothbrush machine, as shown in the following illustration examples. Rack </U> The reciprocation member 24 which has 26a-26d, attaches the 1st hair-bundle 30, and carries out a straight-line reciprocating motion, It gears with said racks 26a-26d of the reciprocation member 24, and is characterized by the thing it comes to prepare the brush gears 27a-27d which attach the 2nd hair-bundle 31 and carry out a rotation reciprocating motion in an orientation.
[0011] As shown in the following illustration examples, in the gear-tooth brush 20-40 of an electric toothbrush machine according to claim 1, invention according to claim 2 allots a hair-bundle to three trains, and is characterized by what it comes to equip both sides said 1st hair-bundle with middle for as said 2nd hair-bundle.
[0012] Invention according to claim 3 is set to the gear-tooth brush 20 of an electric toothbrush machine according to claim 1, as shown in the following illustration examples. It is characterized by the thing carry out the straight-line reciprocating motion of said reciprocation member 24 by the motor 10, carry out the straight-line reciprocating motion of said 1st hair-bundle 30, carry out the rotation reciprocating motion of said brush gears 27a-27d which gear with the racks 26a-26d of the reciprocation member 24, and it comes to do the rotation reciprocating motion of said 2nd hair-bundle 31.
[0013] Invention according to claim 4 is set to the gear-tooth brush 40 of an electric toothbrush machine according to claim 1, as shown in the following illustration examples. Carry out the rotation reciprocating motion of said brush gears 27a-27d by the motor 10, and the rotation reciprocating motion of said 2nd hair-bundle 31 is carried out. It is characterized by the thing carry out the straight-line reciprocating motion of said reciprocation member 24 which has the racks 26a-26d which gear with the brush gears 27a-27d, and it comes to do the straight-line reciprocating motion of said 1st hair-bundle 30.
[0014]
[Function] And with the gear-tooth brush 20-40 according to claim 1, when brushing teeth, the straight-line reciprocating motion of the 1st hair-bundle 30 is carried out, and the 2nd hair-bundle 31 is rotated.
[0015] In the gear-tooth brush 20-40 according to claim 2, at the time of the toothbrushing, the straight-line reciprocating motion of the 1st hair-bundle 30 is carried out on both sides, and the 2nd hair-bundle 31 is rotated in right in the middle.
[0016] With the gear-tooth brush 20 according to claim 3, at the time of the toothbrushing, while carrying out the rotation reciprocating motion of the brush gears 27a-27d which carry out the straight-line reciprocating motion of the reciprocation member 24 by the motor 10, and gear with the racks 26a-26d of the reciprocation member 24 and carrying out the straight-line reciprocating motion of the 1st hair-bundle 30, the rotation reciprocating motion of the 2nd hair-bundle 31 is carried out. [0017] With the gear-tooth brush 40 according to claim 4, at the time of the toothbrushing, while carrying out the straight-line reciprocating motion of the

reciprocation member 24 which has the racks 26a-26d which carry out the rotation reciprocating motion of the brush gears 27a-27d by the motor 10, and gear with the brush gears 27a-27d and carrying out the straight-line reciprocating motion of the 1st hair-bundle 30, the rotation reciprocating motion of the 2nd hair-bundle 31 is carried out. [0018]

[Example] Hereafter, the example of this invention is explained, referring to a drawing. The gear-tooth brush mechanical component of an electric toothbrush machine which attaches in drawing 4 and drawing 3 the gear-tooth brush which is one example of this invention is shown. Although this gear-tooth brush mechanical component carries out an illustration abbreviation, it is contained in the sheathing case of the body of a vessel which can be grasped single hand. And power sources 11 and 12 like the charge cell by which the sign 10 in drawing drives a motor and 11 drives the motor 10 are switches which turn a motor 10 on and off. A motor 10 attaches in the driving shaft the motor gear 13 which is a bevel gear, and engages the motor gear 13 to a contrate gear 14. A contrate gear 14 attaches an eccentric cam 15 in the medial-axis 14a. the hole which forms an eccentric cam 15 in lower limit 16a of a crank 16 -- it arranges in 16b. And a crank 16 is energized up, contacts the periphery of an eccentric cam 15 and enables reciprocation of the inside of hole 16b under drawing Nakagami.

[0019] A deer is carried out and an above-mentioned electric toothbrush machine is attached for the gear-tooth brush 20 of this invention shown in the crowning of said body of a vessel at drawing 1 and drawing 2 , enabling free attachment and detachment. The gear-tooth brush 20 is equipped with a case 21. A case 21 forms the interior in midair and consists of pedicel case 21a of straight side, and head case 21b. Between two the longwise brush long hole 22 and its brush long hole 22, two or more brush round holes 23 are opened in vertical 1 train, and head case 21b becomes it at toothbrushing side 21c, as shown in drawing 2 . And as shown in drawing 1 , the reciprocation member 24 is formed in this case 21. The reciprocation member 24 consists of a shank 25 which doubles with the appearance of a case 21 and arranges a configuration smaller than it in nothing and pedicel case 21a, and the ring section 26 arranged in head case 21b. A shank 25 connects with the upper limit of the crank 16 of the above-mentioned brush mechanical component the lower limit which is not illustrated. The ring section 26 comes to prepare two or more racks 26a-26d in the inner sense. Moreover, inside the ring section 26, two or more brush gears 27a-27d are formed in vertical 1 train. And it comes to engage these brushes gears 27a-27d on Racks 26a-26d, respectively. Furthermore, this gear-tooth brush 20 attaches the 2nd hair-bundle 31 in each brush gears 27a-27d while attaching two or more 1st hair-bundles 30 in the longwise part of the ring section 26. And as shown in drawing 2 , while projecting the 1st hair-bundle 30 outside through the brush long hole 22, the 2nd hair-bundle 31 is projected outside through the brush round hole 23, and it comes to allot vertical 3 train.

[0020] Now, when brushing teeth using the electric toothbrush machine mentioned above, after having said body of a vessel by hand and turning this gear-tooth brush 20 in the oral cavity, a switch 12 is turned on and a motor 10 is driven. And from the motor gear 13, rotation of the motor 10 is transmitted to a contrate gear 14, and is slowed down, and an eccentric cam 15 is rotated. A deer is carried out, rotation is changed into a straight-line reciprocating motion with a crank 16, and straight-line reciprocation of the reciprocation member 24 is carried out up and down by fixed stroke. Then, the brush gears 27a-27d both carry out rotation reciprocation to if the 1st hair-bundle 30 on the ring section 26 carries out a straight-line reciprocating motion at a small unit through engagement with Racks 26a-26d, and the 2nd hair-bundle 31 on these brushes gear 27a-27d carries out a rotation reciprocating motion, respectively. And when a hair-bundle 30-31 is suitably applied to a toothbrushing part, dirt, such as a dental plaque which adhered to the engagement side of between a gear tooth and the gums or a gear tooth in the 1st hair-bundle 30 which carries out a straight-line reciprocating motion, is removed effectively. Moreover, the dirt which adhered between a dental front face or gear teeth in the 2nd hair-bundle 31 which carries out a rotation reciprocating motion is removed effectively.

[0021] By the way, although straight-line reciprocation of the reciprocation member 24 is carried out by the gear-tooth brush mechanical component and rotation reciprocation of the brush gears 27a-27d is carried out through engagement with the racks 26a-26d in the illustration example mentioned above, as shown below, it is also possible to carry out rotation reciprocation of the brush gear by the gear-tooth brush mechanical component, and to consider a reciprocation member as the configuration which carries out straight-line reciprocation through engagement with the brush gear and rack on the contrary.

[0022] In the other examples, as shown, for example in drawing 5 , a reduction gear 36 is engaged on the motor gear 35 of a gear-tooth brush mechanical component, and an eccentric cam 15 is attached in the top face of the reduction gear 36. an eccentric cam 15 is shown in drawing 6 -- as -- the hole of a crank 37 -- it arranges in 37a. A crank 37 makes rotation free a core [ the connection shaft 38 ] so that the lower limit of the connection shaft 38 may be connected and illustrated at a left end.
[0023] And in other examples, as shown in drawing 7 , in pedicel case 21a of a case 21, the gear-tooth brush 40 arranges the gear shaft 41, and comes. The gear shaft 41 connects the lower limit with the above-mentioned connection shaft 38, and attaches in upper limit the transfer gear 42 which is a bevel gear. Moreover, in head case 21b, as drawing 8 also shows, two or more brush gears 27a-27d which gear mutually in vertical 1 train are formed. And it comes to engage the transfer gear 42 to brush gear 27a of the bottom. Furthermore, in head case 21b, as shown in drawing 7 , the brush gears 27a-27d are surrounded, and the ring-like reciprocation member 43 is formed free [ vertical movement ]. The reciprocation member 43 has rack 43a and 43b of the inside sense mutually into the longwise part. And it comes to engage these rack 43a and 43b with brush gear 27a and 27b, respectively.
[0024] When carrying out a deer and brushing teeth using the electric toothbrush machine of other examples, said motor 10 is driven, from the motor gear 35, rotation of the motor 10 is transmitted to a reduction gear 36, and is slowed down, and an eccentric cam 15 is rotated. And rotation is changed into a rotation reciprocating motion with a crank 37, and rotation reciprocation of the connection shaft 38 is carried out. A deer is carried out, rotation reciprocation of the transfer gear 42 is carried out through the gear shaft 41, rotation reciprocation of brush gear 27a, 27b, and the 27 c.27d is carried out one by one through engagement with the transfer gear 42, and straight-line reciprocation of the reciprocation member 43 is carried out through engagement with brush gear 27 c.27d, and rack 43a and 43b of them. And while the 2nd hair-bundle 31 on each brush gear 27a-27d performs a rotation reciprocating motion, the 1st hair-bundle 30 on the reciprocation member 43 performs a straight-line reciprocating motion.
[0025] In addition, the gear-tooth brush 20-40 of this invention is good also as a configuration which makes the 1st hair-bundle 30 of those both sides higher than the 2nd hair-bundle 31 of middle, as shown in drawing 9 . The hair ends of the 1st hair-bundle 30 of one side tend to hit between a gear tooth and the gum, and can remove dirt, such as a dental plaque in the meantime, much more effectively as it is shown in drawing 10 , when this brushes teeth by applying these hair-bundles 30-31 to a tooth flank.
[0026]
[Effect of the Invention] Therefore, when brushing teeth according to this invention, the straight-line reciprocating motion of the 1st hair-bundle is carried out. Since the 2nd hair-bundle is rotated, while being able to remove effectively dirt, such as a dental plaque which adhered between a gear tooth and the gum etc. in work of the straight-line reciprocating motion of the 1st hair-bundle It can brush teeth effectively and efficiently with one gear-tooth brush, without being able to remove effectively the dirt which adhered between a gear tooth and gear teeth and to a dental engagement side etc. in work of rotation of the 2nd hair-bundle, using an electric toothbrush machine properly like before, or exchanging a gear-tooth brush.

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[Translation done.]

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section of the gear-tooth brush which is one example of this invention.

[Drawing 2] It is the front view of the gear-tooth brush.
[Drawing 3] It is the structure explanatory view of the gear-tooth brush mechanical component of an electric toothbrush machine which attaches the gear-tooth brush.
[Drawing 4] It is the structure explanatory view which looked at the gear-tooth brush mechanical component of the drawing 3 from the side.
[Drawing 5] It is the structure explanatory view of the gear-tooth brush mechanical component of an electric toothbrush machine which attaches the gear-tooth brush which are other examples of this invention.
[Drawing 6] It is the configuration explanatory view of the movement translator in the gear-tooth brush mechanical component.
[Drawing 7] It is drawing of longitudinal section of the gear-tooth brush of other examples.
[Drawing 8] It is the engagement state diagram of the transfer gear and brush gear.
[Drawing 9] It is the block diagram showing an example of the height of the hair-bundle of the gear-tooth brush of this invention.
[Drawing 10] It is the condition explanatory view showing a toothbrushing condition with the gear-tooth brush.
[Drawing 11] The condition of brushing teeth with the conventional gear-tooth brush which attaches two or more hair-bundles free [ rotation reciprocation ] is shown, the condition that (a) polishes between a gear tooth and gear teeth is shown, and (b) is the condition explanatory view showing the condition of polishing a dental engagement side.
[Drawing 12] It is the perspective view of the gear-tooth brush.
[Drawing 13] The condition of brushing teeth with the conventional gear-tooth brush attached for two or more hair-bundles, enabling free continuation rotation is shown, and the perspective view (b) showing the condition that (a) polishes a dental front face is the side elevation.
[Drawing 14] It is the perspective view of the gear-tooth brush.
[Drawing 15] The condition that (a) polishes the boundary line of a gear tooth and the gum is shown, the condition of brushing teeth with the conventional gear-tooth brush which enables straight-line reciprocation of the gear-tooth brush itself is shown, and (c) is [ the condition that (b) polishes a dental front face is shown, and ] the condition explanatory view showing the condition of polishing a dental engagement side.
[Drawing 16] It is the perspective view of the gear-tooth brush.
[Drawing 17] It is the condition explanatory view showing the condition of polishing a dental front face with the conventional gear-tooth brush which enables rotation reciprocation of the gear-tooth brush itself.
[Drawing 18] It is the perspective view of the gear-tooth brush.
[Description of Notations]
20-40 Gear-tooth brush
24-43 Reciprocation member
26a-26d, 43aand43b Rack
27a-27d Brush gear

30 1st Hair-bundle
31 2nd Hair-bundle
42 Transfer Gear

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[Translation done.]

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DRAWINGS

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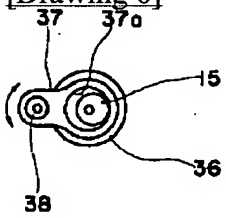
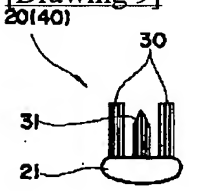
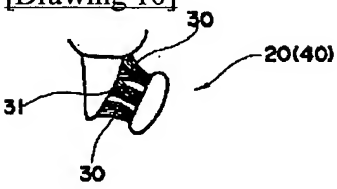
[Drawing 6]



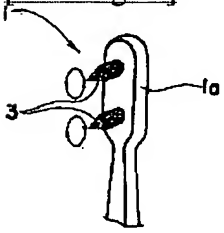

[Drawing 9]




[Drawing 10]




[Drawing 14]

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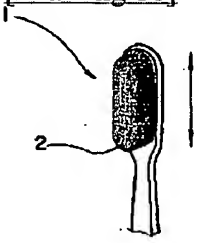
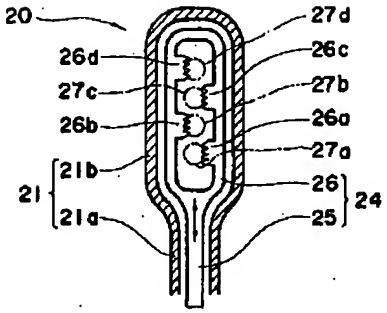
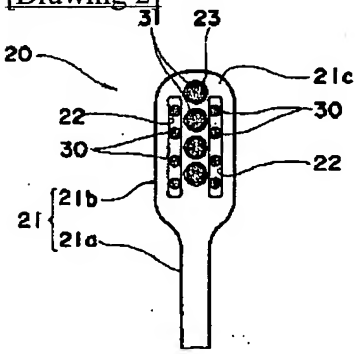



[Drawing 1]




[Drawing 2]

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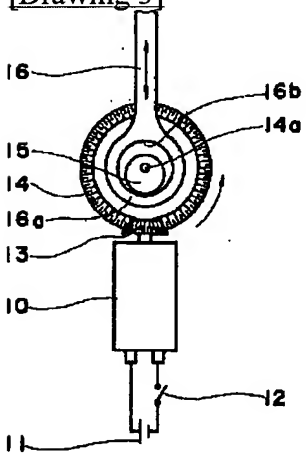
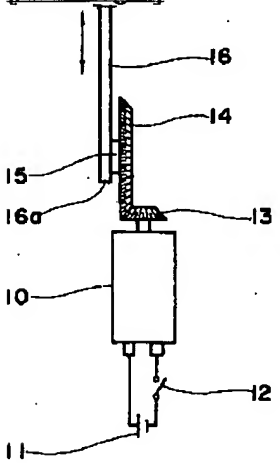
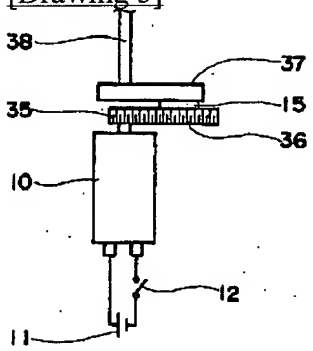


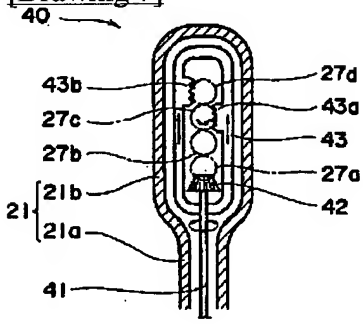

[Drawing 4]



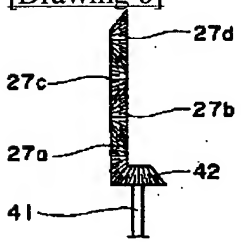
[Drawing 5]




[Drawing 7]

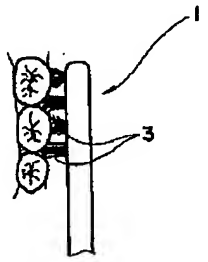



[Drawing 8]

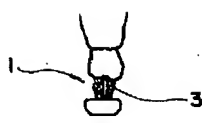



[Drawing 11]

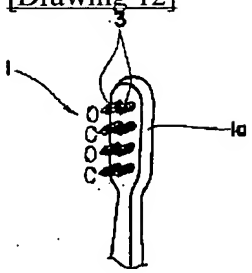
( a )



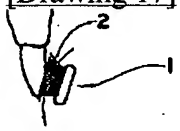

( b )



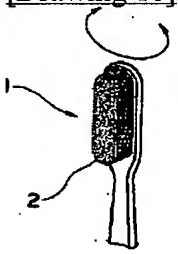
[Drawing 12]




[Drawing 17]

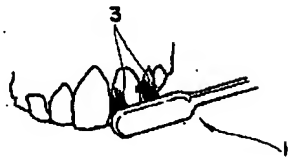



[Drawing 18]




[Drawing 13]

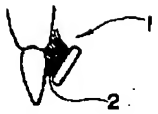
( a )



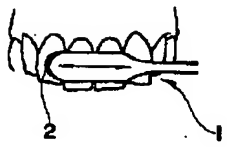

( b )


[Drawing 15]

(a)




(b)




(c)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[Translation done.]